

**NORTH CAROLINA DIVISION OF
AIR QUALITY**

Application Review

Issue Date:

Region: Wilmington Regional Office
County: Columbus
NC Facility ID: 2400093
Inspector's Name: Mark Hedrick
Date of Last Inspection: 06/08/2017
Compliance Code: 3 / Compliance - inspection

Facility Data Applicant (Facility's Name): Hexion Inc. - Acme Operations Facility Address: Hexion Inc. - Acme Operations 333 Neils Eddy Road Riegelwood, NC 28456 SIC: 2869 / Industrial Organic Chemicals,nec NAICS: 325199 / All Other Basic Organic Chemical Manufacturing Facility Classification: Before: Title V After: Title V Fee Classification: Before: Title V After: Title V				Permit Applicability (this application only) SIP: 2D .0515, 2D .0521, 2D .1100, 2Q .0317 NSPS: N/A NSPS: N/A NESHAP: N/A PSD: N/A PSD Avoidance: Yes NC Toxics: Yes 112(r): Yes Other: N/A			
Contact Data				Application Data			
Facility Contact Tom Buller Regional EHS Manager (910) 274-5921 333 Neils Eddy Road Riegelwood, NC 28456	Authorized Contact Ronald Bazinet Site Leader (910) 655-2263 333 Neils Eddy Road Riegelwood, NC 28456	Technical Contact Tom Buller Regional EHS Manager (910) 274-5921 333 Neils Eddy Road Riegelwood, NC 28456	Application Number: 2400093.17A Date Received: 03/08/2017 Application Type: Modification Application Schedule: TV-Significant Existing Permit Data Existing Permit Number: 01394/T48 Existing Permit Issue Date: 03/23/2017 Existing Permit Expiration Date: 02/20/2022				
Total Actual emissions in TONS/YEAR:							
CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2015	0.0200	63.60	27.07	2.23	1.67	22.69	19.81 [Methanol (methyl alcohol)]
2014	0.0200	63.55	37.58	2.22	1.98	29.10	26.45 [Methanol (methyl alcohol)]
2013	0.0200	21.69	35.95	2.29	2.23	27.78	26.18 [Methanol (methyl alcohol)]
2012	0.0300	23.25	40.35	3.62	2.56	30.46	29.41 [Methanol (methyl alcohol)]
2011	0.0200	21.13	39.85	3.35	2.40	30.37	29.05 [Methanol (methyl alcohol)]
Review Engineer: Betty Gatano Review Engineer's Signature: _____ Date: _____				Comments / Recommendations: Issue 01394/T49 Permit Issue Date: Permit Expiration Date:			

1. Purpose of Application

Hexion Inc. – Acme Operations (Acme) currently holds Title V Permit No. 01394T48 with an expiration date of February 28, 2022 for a chemical manufacturing facility in Riegelwood, Columbus County, North Carolina. A permit application for a Title V significant modification was received on March 8, 2017. The facility requests the following changes under this permit application:

- Remove the publicly owned wastewater treatment works (POTW) (ID No. ES-POTW).
- Allow overheads water that had been sent to the POTW to be sent to the cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07).
- Update the modeled permitting limits for the cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07) for compliance with NC Air Toxics.
- Add a limit on emissions of volatile organic compounds (VOCs) to avoid applicability to 15A NCAC 02D .0530, “Prevention of Significant Deterioration” (PSD).

2. Facility Description

Acme is a chemical manufacturing facility that produces formaldehyde, resin, hexamethylene-tetramine (hexamine), and various specialty chemicals. The processes at the plant are divided into three distinct chemical manufacturing processes:

- Formaldehyde Chemical Manufacturing Process Unit (CMPU)¹ – This process reacts methanol with air to form formaldehyde through a catalytic oxidation process. The CMPU includes three reactors and four adsorption columns for recovering the product, as well as storage tanks and a formaldehyde loading rack. Formaldehyde is one of the chemicals listed in Table 1 of 40 CFR Part 63 Subpart F, making this CMPU subject to the “NESHAP from the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater,” 40 CFR Part 63 Subpart G. Rules 40 CFR Part 63 Subparts F, G, and H are collectively referred to as the “Hazardous Organic NESHAP” or HON.
- Special Project Miscellaneous Organic Chemical Manufacturing Process Unit (MCPU)¹ – Various products, including ketone resins, can be manufactured in this process area using batch reactors. This MCPU is subject to the “NESHAP for Miscellaneous Organic Chemical Manufacturing, 40 CFR 63 Subpart FFFF, also referred to the “Miscellaneous Organic NESHAP” or MON.
- Hexamine CMPU¹ – Hexamine is formed by reacting formaldehyde and ammonia. The CMPU includes a reactor, evaporator, crystallizers, and a centrifuge. Acme can sell the hexamine in slurry form or can dry the product through a centrifugal process. Hexamine is one of the chemicals listed in Table 1 of 40 CFR Part 63 Subpart F, making this CMPU also subject to the HON.

The plant also includes raw material handling and storage operations, utility operations, including steam production and cooling towers, and finished product loadout activities.

¹ The term CMPU is used to refer to chemical process subject to HON, while MCPU is used to refer to chemical process subject to the MON.

As a chemical manufacturing facility, the existing major source threshold for the facility under PSD permitting program provided in 02D .0530 is 100 tons per consecutive 12-month period of one or more of any regulated New Source Review (NSR) pollutants. The facility has an enforceable limit on sulfur dioxide (SO₂) emissions, which enables it to be classified as an existing minor PSD source. Prior to this permit application, potential emissions of all other PSD-regulated pollutants, including greenhouse gases, were less than the PSD major source thresholds. Acme is a Title V facility because potential hazardous air pollutants (HAP) emissions are greater than 10 tpy of individual HAPs and 25 tpy of total HAPs.

3. Application Chronology

March 8, 2017	A permit application for a TV signification modification (also called a “one step significant modification”) under 15A NCAC 02Q .0501(c)(1) was received.
March 10, 2017	Sent acknowledgment letter indicating the application for significant modification was NOT complete. The DAQ mistakenly stated the permit fee was not included in the permit application.
March 24, 2017	The check for the permit fee was found in the permit application in the Wilmington Regional Office (WiRO). The permit application was considered complete.
March 31, 2017	Betty Gatano sent an e-mail to Taylor Loftis, consultant for the facility, requesting clarification on emission calculations and references.
April 27, 2017	Taylor Loftis provided a response via e-mail.
May 16, 2017	<p>Taylor Loftis confirmed via e-mail cooling tower No. 5 (ID No. ES-003-05) and the lined pond (ID No. ES-005) should be removed from the permit. Information about these emission sources is provided below:</p> <ul style="list-style-type: none">• Under Air Permit No. 01394T47, cooling tower No. 7 was added to the permit and cooling tower No. 5 was permitted to operate only until cooling tower No. 7 becomes operational. In the response, Taylor Loftis indicated that cooling tower No. 7 was not yet operational but the piping for cooling tower No. 5 has been removed and the unit is permanently disconnected.• In a response to comments received April 27, 2017, Taylor Loftis indicated the lined pond is currently only used for rain water collection and is no longer part of the production process.
May 17, 2017	Matthew Porter of the Air Quality Analysis Branch (AQAB) of the DAQ sent an e-mail to Taylor Loftis regarding emissions from Silar LLC (dba Silar Laboratories) (Silar). Silar and Acme and a third facility were once a single facility known as Wright Chemical, and as a consequence, previous air modeling for these facilities were interrelated. Mr. Porter’s e-mail stated the following:

We need confirmation on the operation of 3rd-party on-site sources of formaldehyde and ammonia. If these sources are in operation and contribute to facility-wide emissions of formaldehyde and/or ammonia, please include them in the modeling. In any case, we need a statement we can include with the application (i.e., email or letter, etc.) confirming the operational status of these 3rd-party on-site sources.

June 1, 2017	Personnel from Raleigh Central Office and WiRO participated in a conference call with personnel from Silar and Acme and their consultants regarding modeling under NC Air Toxics. As a consequence of the meeting, the DAQ indicated discussion with management regarding the modeling was required.
June 27, 2017	Personnel from DAQ, Acme, and their consultants met in Raleigh to discuss the air modeling. The receptors for the modeling were agreed upon, and it was confirmed emissions from Silar would be set at zero in the air modeling based on the actual emissions. Silar has never reported emissions of ammonia or formaldehyde in its DAQ emission inventories.
July 7, 2017	Betty Gatano and Taylor Loftis discussed HON applicability to the wastewater system at Acme. After further discussion with William Willets, Permitting Chief, DAQ concurred with Acme and the current permit that the point of determination is prior to the hexamine air stripper, making the wastewater system a Group 1 process wastewater stream under the HON.
July 24, 2017	Revised air dispersion modeling was received.
August 8, 2017	Matthew Porter of the AQAB of the DAQ issued a memorandum approving Acme's air modeling, which demonstrated compliance with NC Air Toxics.
August 9, 2017	Draft permit and permit review forwarded internally for review.
August 17, 2017	Comments on the draft permit review received from Matt Porter.
August 17, 2017	Taylor Loftis provided revised potential emissions from the cooling towers via e-mail. The draft permit review was updated to reflect the revised emissions.
August 18, 2017	Ashby Armistead of the WiRO provided comments regarding emissions and modeling assumptions. Betty Gatano and William Willets responded to his comments via e-mails on August 21, 2017 and August 22, 2017, respectively.
August 23, 2017	Comments on the draft permit and permit review received from Mark Cuilla, Permitting Supervisor.
August 25, 2017	Revised draft permit and permit review forwarded to Acme for comments.
September 1, 2017	Comments received from Taylor Loftis. The facility had comments on requirement to limit the overheads flowrate to the cooling towers for

compliance with NC Air Toxics limits. Upon review with the modeler and the DAQ supervisor, the DAQ determined no limit on the overheads flowrate to the cooling towers was needed due to negligible contribution to the ambient concentration attributable to emissions from the cooling towers.

September xx, 2017 Permit and review forwarded to public notice.

4. Permit Modifications/Changes and TVEE Discussion

The following table describes the changes to the current permit under this permit modification.

Pages	Section	Description of Changes
Cover and throughout	--	Updated all dates and permit revision number.
3	1.0 Equipment Table	<ul style="list-style-type: none"> Removed cooling tower (ID No. ES-003-05) and associated footnote. Removed lined pond (ID No. ES-005). Removed publicly owned wastewater treatment works (ID No. ES-POTW).
28	2.1 H – Equipment List	<ul style="list-style-type: none"> Removed cooling tower (ID No. ES-003-05) and associated footnote. Removed lined pond (ID No. ES-005). Removed publicly owned wastewater treatment works (ID No. ES-POTW).
29	2.1 H – Regulations Table	Added reference to PSD avoidance for the cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07)
29	2.1 H.1.a	Removed cooling tower (ID No. ES-003-05).
29	2.1 H.2.a	Removed cooling tower (ID No. ES-003-05).
30	2.1 H.4	Added permit condition for PSD avoidance for VOCs based on emissions from cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07).
--	2.1 J	Removed permit condition for POTW (ID No. ES-POTW).
40	2.2 B.1.a	<ul style="list-style-type: none"> Updated allowable emission rates for three cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07) to corresponded with updated modeling for compliance with NC Air Toxics. Removed cooling tower (ID No. ES-003-05). Removed lined pond (ID No. ES-005). Removed publicly owned wastewater treatment works (ID No. ES-POTW).
40 – 41	2.2 B.1.d	Added requirements to report deviations from NC Air Toxics emission limits on a semiannual basis.
43 – 50	Section 3	Updated the General Conditions to the most recent revision (5.1, 08/03/2017).
51	Attachment	Updated the list of acronyms.

The following changes were made to the Title V Equipment Editor (TVEE) under this permit modification:

- Removed POTW (ID No. ES-POTW).
- Removed cooling tower (ID No. ES-003-05).
- Removed lined pond (ID No. ES-005).

5. Removing the POTW

The reaction of ammonia and formaldehyde forms hexamine and water. Acme uses an air stripper (ID No. ES-001-02f) to remove VOCs, HAPs, and toxic air pollutants (TAPs) from hexamine CMPU byproducts water. The VOC/HAP/TAP laden air stream from the stripper is sent to a natural gas/LPG-fired catalytic oxidizer (ID No. CD-001-02b), while the overheads water from the stripper is currently being sent to the three cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07) and/or the POTW.

Acme is the sole supplier of wastewater to the POTW (ID No. ES-POTW) located adjacent to the facility. Acme is required to maintain a minimum feed rate of the overheads water to the POTW to ensure enough organic matter is provided to the aerobic bacteria present in the POTW's treatment process. Because a minimum feed rate of overheads water to the POTW must be maintained, Acme must supplement water to the cooling towers with water from the creek that flows adjacent to the facility. With the closing of the POTW, Acme will be able to send all overheads water to the cooling towers thereby reducing the consumption of creek water used in the cooling towers.

Acme originally proposed two scenarios for operating the cooling towers with the increased overheads water feed rate. The scenarios were modified as issues with the air modeling arose. In the end, one process scenario was selected with overheads water feed to all three cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07), with additional water from the adjacent creek fed to the cooling towers. Note the process scenario is different than the modeling scenarios discussed below.

Removal of the POTW and modifying the overheads flowrate to three cooling towers is hereafter referred to as the cooling tower project in this permit review.

Emissions

Hexamine is formed by reacting formaldehyde and ammonia, and any unreacted formaldehyde and ammonia are expected in the hexamine byproducts water. Methanol, which is a raw material in formaldehyde production, has also been detected in the hexamine byproducts water. Sampling conducted in 2016 indicate no other VOCs are present in the overheads water. Emissions of these compounds are calculated from the following equation. Values for Cooling Tower No. 3 (ID No. ES-003-03) for methanol emissions are provided as an example:

$$E = E_{\text{vap}} \times \rho_{\text{H}_2\text{O}} \times \text{Con} \times \text{CF} \times 8760 \text{ hours/yr}$$

Where:

E =	Emission rate, lb/yr
E_{vap} =	Evaporation rate, gallons per hour
$\rho_{\text{H}_2\text{O}}$ =	Density of water, lb/gallons
Con =	Concentration in ppmw

CF = 1 ppmw = 1 pound per 1,000,000 pounds

For Cooling Tower # 3

E_{vap} = Evaporation rate is assumed to be equal to overheads water rate as a worse-case assumption, which is 3,180 gals/hour for Cooling Tower No. 3

ρH₂O = 8.34 lb/gallons

Con = 1,000 ppmw for methanol in the overheads water based on 2016 sampling data and HON Group 2 wastewater definition.

CF = 1 ppmw = 1 pound per 1,000,000 pounds

$$E = (3,180 \text{ gal/hr}) * (8.34 \text{ lb/gal}) * (1,000 \text{ ppmw}) * (1/10^6) * 8,760 \text{ hours} = 232,326 \text{ lb/yr}$$

Particulate matter (PM) emissions are also expected from the cooling towers due to the total dissolved solids (TDS) in the creek water used in the cooling towers. The potential PM emissions are based on the drift rate and recirculation rate for each cooling tower, as shown in the following sample calculation. Values for Cooling Tower No. 3 (ID No. ES-003-03) are provided as an example:

$$PM = Q \times EF \times \% \text{ drift}/100 \times 60 \text{ minutes/hour} * 8760 \text{ hours/year}$$

Where:

PM = Particulate matter emissions, lbs/yr

Q = Recirculation rate, gallons per minute.

% Drift = Drift rate

EF = PM emission factor, lb/10³ gallons.

For Cooling Tower # 3

Q = A value of 2800 gallons per minute recirculation rate is used for Cooling Tower No. 3

% Drift = A value of 0.02% drift for induced draft cooling towers, from EPA's AP-42 Section 13.4 Table 13.4-1. This value is conservative and suitable for older cooling towers.

EF = A value of 0.019 lb/10³ gallons of PM, for induced draft cooling towers, from EPA's AP-42 Section 13.4 Table 13.4-1. This value assumes a total dissolved solids content of 12,000 ppm.

$$PM = (2800 \text{ gpm}) * (0.02/100) * 0.019 \text{ lb}/10^3 \text{ gallons} * 60 \text{ min/hr} * 8760 \text{ hours/yr} = 5.6 \text{ lb/yr}$$

Emissions from the cooling towers after removal of the POTW are provided in Table 1 below. The table includes the maximum short-term hourly emissions, which were used in the air modeling (i.e., Modeling Scenario 3), and maximum long-term annual emissions, which represent the potential emissions from the cooling towers. Assumptions used in the emission calculations are provided in the footnotes to the table.

Table 1. Potential Emissions from the Cooling Towers after Modification

Table 1A. Maximum Short-Term Hourly Emissions

Parameter	CT # 3	CT # 7	CT # 6	Total
Overheads Water Usage				
OH Water Usage, gal/hr	3,180	1,590	1,590	6,360
Emissions from Cooling Towers				
Formaldehyde emission rate (lb/hr)	2.652E+00	1.326E+00	1.326E+00	5.30
Methanol emission rate (lb/hr)	2.652E+01	1.326E+01	1.326E+01	53.04
Ammonia emission rate (lb/hr)	3.381E+01	1.691E+01	1.691E+01	67.63
PM ₁₀ emission rate (lb/hr)	6.38E-04	7.30E-05	3.19E-04	1.03E-03

Table 1B. Maximum Long-Term Annual Emissions

Parameter	CT # 3	CT # 7	CT # 6	Maximum Worst Case Before Limits	Maximum Worst Case After Limits
Overheads Water Usage					
OH Water Usage, gal/yr	27,856,800	13,928,400	13,928,400	27,856,800	19,150,000
Emissions from Cooling Towers					
Formaldehyde emissions (lb/yr)	23,233	11,616	11,616	23,233	15,971
Methanol emissions (lb/yr)	232,326	116,163	116,163	232,326	159,711
Ammonia emissions (lb/yr)	296,215	148,108	148,108	296,215	203,632
PM ₁₀ emissions (lb/yr)	5.59	0.64	2.80	9.03	9.03
Total VOC Emissions (ton/yr)	255,558	127,779	127,779	255,558	175,682

Notes for Tables 1A and 1B

- Maximum short-term evaporation rate is based on two times the maximum Hexamine plant generation rate of 53 gal/min.
- Maximum facility-wide annual overheads evaporation rate is based on maximum overheads water generation rate of 53 gal/min or 3,180 gal/hr. Maximum annual overheads evaporation rates for individual cooling towers based on maximum modeled emission rates.
- CT3 has as water recirculation rate of 2,800 gal/min and a drift rate of 0.02%.
- CT6 has as water recirculation rate of 1,400 gal/min and a drift rate of 0.02%.
- CT7 has as water recirculation rate of 1,600 gal/min and a drift rate of 0.004%.
- The selected PM emission factor was 0.019 lb/1,000 gal from AP-42, Chapter 13.4.
- Formaldehyde concentration of 100 ppm in overheads water was from testing conducted by Arcadis (Located in filename: "Acme Lined Pond - Lab Data").
- Methanol concentration of 1,000 ppm in overheads water was based on 2016 facility sampling data and HON Group 2 wastewater definition (<1,000 ppm).
- Ammonia concentration of 1,275 ppm in overheads water was used. All analytical data between 2014 and 2017 showed concentrations below this value.
- Other VOC was data based on sampling conducted in 2016.
- Total emissions after limits are based on facility-wide of <100 tpy VOC PSD avoidance limitation, with VOC emissions from the cooling towers limited to less than 88 tpy.

Acme is an existing PSD minor facility with facility-wide potential emissions of NSR regulated pollutants less than 100 tons per consecutive 12-month period. The facility is accepting a limit on VOC emissions from the cooling towers for PSD avoidance, while emissions of PM10 from the cooling towers remain below the major source threshold for PSD. Thus, the cooling tower project is considered a minor modification under PSD.

Regulatory Review

The three cooling towers at Acme are subject to the regulations discussed in this section.

- 15A NCAC 02D .0515, Particulates from Miscellaneous Industrial Processes – The three cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07) are subject to 02D .0515. PM emissions result from TDS emitted in the drift particles (liquid water entrained in the air stream) from the cooling towers.

For process rates less than 30 tons per hour, the following equation is used:

$$E = 4.10 \cdot (P)^{0.67}$$

where, E = allowable emissions (lbs/hr); and
P = process weight rate (tons/hr).

For cooling towers, the process weight can be considered as the make-up water to the cooling tower. Make-up water depends on the evaporation rate, the blowdown rate, and the drift rate and is unknown for the cooling towers. As worst case assumption (i.e., results in a lower allowable PM emission rate), the process weight was assumed to be equal to the maximum overheads water usage rates for each cooling tower, as shown in Table 1. The process weights are 13.2 tons per hour (3,180 gallons per hour) for Cooling Tower No. 3 and 6.6 tons per hour (1,590 gallons per hour) each for Cooling Towers 6 and 7, assuming a water density of 8.314 pounds per gallon. These values result in allowable PM emission rates of 23.1 pounds per hour for Cooling Tower No. 3 and 14.5 pounds per hour each for Cooling Towers Nos. 6 and 7.

The potential PM emissions are based on the drift rate and recirculation rate for each cooling tower, as shown in the following sample calculation for Cooling Tower No. 3 (ID No. ES-003-03):

$$PM = Q \times EF \times \% \text{ drift}/100 \times 60 \text{ minutes/hour}$$

Where:

PM = Particulate matter emissions, lbs/yr
Q = Recirculation rate, gallons per minute.
% Drift = Drift rate
EF = PM emission factor, lb/10³ gallons.

For Cooling Tower # 3

Q = A value of 2,800 gallons per minute is used for Cooling Tower No. 3
% Drift = A value of 0.02% drift for induced draft cooling towers, from EPA's AP-42 Section 13.4 Table 13.4-1. This value is conservative and suitable for older cooling towers.
EF = A value of 0.019 lb/10³ gallons of PM, for induced draft cooling towers, from EPA's AP-42 Section 13.4 Table 13.4-1. This value assumes a total dissolved solids content of 12,000 ppm.
PM = (2,800 gpm) * (0.02/100) * 0.019 lb/10³ gallons * 60 min/hr = 6.38E-4 lb/hr

The potential and allowable PM emissions for each cooling tower is provided in the table below. As shown in the table, the potential PM emissions are much less than the allowable emissions. No monitoring or reporting is required for these sources, but Acme must maintain production records such that the process rates for the cooling towers can be determined. No changes to the permit are required, and continued compliance is expected.

Cooling Tower ID	Recirculation Rate (gal/min)	Drift Rate (%)	Potential PM emissions (lb/hr)	Allowable Emission Range (lb/hr)
ES-003-03	2,800	0.02	6.38E-04	23.1
ES-003-06	1,400	0.02	3.19E-04	14.5
ES-003-07	1,600	0.004	7.30E-05	14.5
Notes: Drift rates and recirculation rates provided in Appendix C of the permit application.				

- 15A NCAC 02D .0521, Control of Visible Emissions –The three cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07) were manufactured after July 1, 1971 and must not have visible emissions of more than 20 percent opacity when averaged over a six-minute period, except as specified in 15A NCAC 02D .0521(d). As shown above, PM emissions from the three cooling tower are negligible. Visible emissions are also expected to be negligible from these cooling towers. No monitoring, recordkeeping, or reporting is required for these sources, and continued compliance is anticipated.
- 15A NCAC 02D .1100, Control of Air Toxics – This regulation is state-enforceable only. The cooling towers are subject to 02D .1100 and revised modeling for ammonia and formaldehyde was conducted to demonstrate compliance with NC Air Toxics with the increased overheads water being sent to the cooling towers rather than the POTW.

The revised air modeling, which was received on July 24, 2017, contained three scenarios for the cooling towers, as shown in the table below.

Parameter	Scenario 1			Scenario 2			Scenario 3		
	CT # 3	CT # 7	CT # 6	CT # 3	CT # 7	CT # 6	CT # 3	CT # 7	CT # 6
Water Usage, gal/min	53	0.0	0.0	0.0	26.5	26.5	53	26.5	26.5
Formaldehyde emission (lb/hr)	2.65	0.0	0.0	0.0	1.33	1.33	2.65	1.33	1.33
Ammonia emission (lb/hr)	33.8	0.0	0.0	0.0	16.9	16.9	33.8	16.9	16.9

The modeling scenarios differ from the operational scenarios noted previously, with TAP emissions from the modeling scenarios exceeding potential emissions from the cooling towers. Modeling scenarios 2 and 3 cannot be achieved in actuality based on the capacities of the air stripper and the cooling towers. Specifically, cooling towers Nos. 6 and 7 (ID Nos. ES-003-06 and ES -003-07) cannot process the volume of overheads water specified in Scenarios 2 and 3, and the maximum overheads evaporation rate (53 gallons per minute) is exceeded in Scenario 3. Thus, the modeling scenarios adequately represent worst-case TAP emissions from the cooling towers.

Modeled emissions impacts for ammonia and formaldehyde and associated averaging period are shown in the table below as a percentage of the applicable acceptable ambient level (AAL).

Maximum modeled impacts in the table represent emission rates from the cooling towers from the modeling scenarios and emission rates for other sources as provided in the revised modeling.

TAP	Averaging Period	Modeled Concentration (µg/m3)	AAL (µg/m3)	Maximum Modeled Impacts % of AAL
Ammonia	1-hour	2000.4	2700	74 %
Formaldehyde	1-hour	128.9	150	86 %

The modeling was reviewed by Matt Porter of the AQAB, and the results were provided in a memorandum dated August 8, 2017. The modeling analysis demonstrated facility-wide toxics emissions impacts following closure of the POTW plant are below applicable standards on a source-by-source basis.

- 15A NCAC 02Q .0317, Avoidance Conditions – A condition to limit VOC emissions from the cooling towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07) for avoidance of 15A NCAC 02D .0530 will be added under this modification. More detail on the PSD avoidance condition is provided below in Section 6.

Applicability to MACT G (HON)

The byproduct water from the hexamine CMPU is subject to the HON, as a Group 1 process wastewater stream pursuant to 40 CFR 63.132(c). Acme has elected to comply with the HON with an air stripper (ID No. ES-001-02f) that meets the fraction removal (Fr) rate of 31% (weight %) for methanol as specified in Table 9 of 40 CFR 63 Subpart G. Testing on the air stripper was performed August 11, 2010 to demonstrate the removal efficiency of methanol meets the requirements of 40 CFR 63, Subpart G. The test results are provided in the following table.

Pollutant in Wastewater	Air Stripper Inlet Wastewater Methanol	Air Stripper Outlet Wastewater Methanol	Fraction Removal Efficiency, (%Fr)	%Fr Efficiency Limit
Methanol	59.6 lb/hr	28.8 lb/hr	51.8%	31%
Notes: <ul style="list-style-type: none"> • Test results were approved by Gregg O’Neal of the Stationary Source Compliance Branch in a memorandum dated January 20, 2011. • Formaldehyde and ammonia are also in the wastewater stream but are not regulated wastewater pollutants under the HON. 				

Total organic HAP emissions from the air stripper are reduced via the natural gas/LPG-fired catalytic oxidizer (ID No. CD-001-02b) by 95 percent by weight or greater in accordance with 40 CFR 63.139(c)(1)(i). The catalytic oxidizer meets the applicable control device requirements specified in 40 CFR 63.139 and 63.145 (i) and (j) and the applicable leak inspection provisions specified in 40 CFR 63.148.

Per 40 CFR 63.138(a), once a Group 1 wastewater stream or residual removed from a Group 1 wastewater stream has been treated in accordance with the HON, the wastewater stream is no longer subject to the requirements of 40 CFR 63, Subpart G. Therefore, the process wastewater can be sent to the cooling towers after treatment with the air stripper, and the cooling towers themselves are NOT subject to the HON.

During the permit review for this project, a question arose regarding the characterization of the air stripper (ID No. ES-001-02f) under the HON. The air stripper (ID No. ES-001-02f) treats bottoms from the hexamine distillation column (ID No. ES-001-02.5), and depending on where the point of determination is established, the air stripper may be considered either a recovery device or a wastewater treatment unit under the HON.

The point of determination (POD), which is defined as the point where process wastewater exits the chemical manufacturing process unit, is currently established as prior to the air stripper. With this POD, the hexamine byproduct water is subject to the HON as a Group 1 process wastewater as discussed above. Although most of the wastewater from the air stripper is sent to the cooling towers, approximately 23%² of the wastewater from the air stripper is recycled to the aqueous ammonia batch process and the formaldehyde process. Because a percentage of the wastewater is recycled, an argument can be made that the air stripper is not a treatment unit under the HON but a recovery device. As defined under 40 CFR 63.111, a recovery device means an individual unit of equipment capable of and normally used for recovering chemicals for fuel value, use, reuse, or for sale.

If the air stripper were considered a recovery device, the POD would then be established after the air stripper. The wastewater from the air stripper would be considered a Group 2 wastewater stream, with an annual average concentration of methanol less than 1,000 parts per million by weight. In this situation, the cooling towers would be subject to the HON as Group 2 wastewater process streams. However, the HON requires no treatment or controls for Group 2 wastewater streams, and the facility would be only required to identify the streams and keep records of flowrates.

Regardless of where the POD is established, the effect on the wastewater stream is essentially the same. Whether the stream is considered a Group 1 or Group 2 wastewater stream, no treatment or control is required post air stripper. The only requirement is additional recordkeeping for Group 2 wastewater streams as noted above.

The DAQ has reviewed the situation and determined the air stripper is properly designated as a wastewater treatment unit as currently permitted. There are two primary reasons for this determination. First, any methanol, formaldehyde, or ammonia contained in the overheads from the air stripper (e.g., the residual) is not used, reused, or sold but is destroyed by the catalytic oxidizer (ID No. CD-001-02b). Secondly, most of the wastewater will be used in the cooling towers, with a small percentage recycled as make up water to the aqueous ammonia and formaldehyde processes. Based on destruction of the residuals from the air stripper and the subsequent usage of the water, the primary purpose of the air stripper does not appear to be for chemical recovery.

6. PSD Avoidance Condition

Chemical processing plants, such as Acme, are one of the 28 listed source categories under 40 CFR 51.166(b)(1)(i)(a) that are considered major sources under PSD if they have the potential to emit 100 tons per consecutive 12-month period for one or more of any regulated NSR pollutants. Potential emissions of VOC from the cooling tower project exceed the PSD threshold for chemical facilities. All other pollutants remain below the PSD threshold after modification.

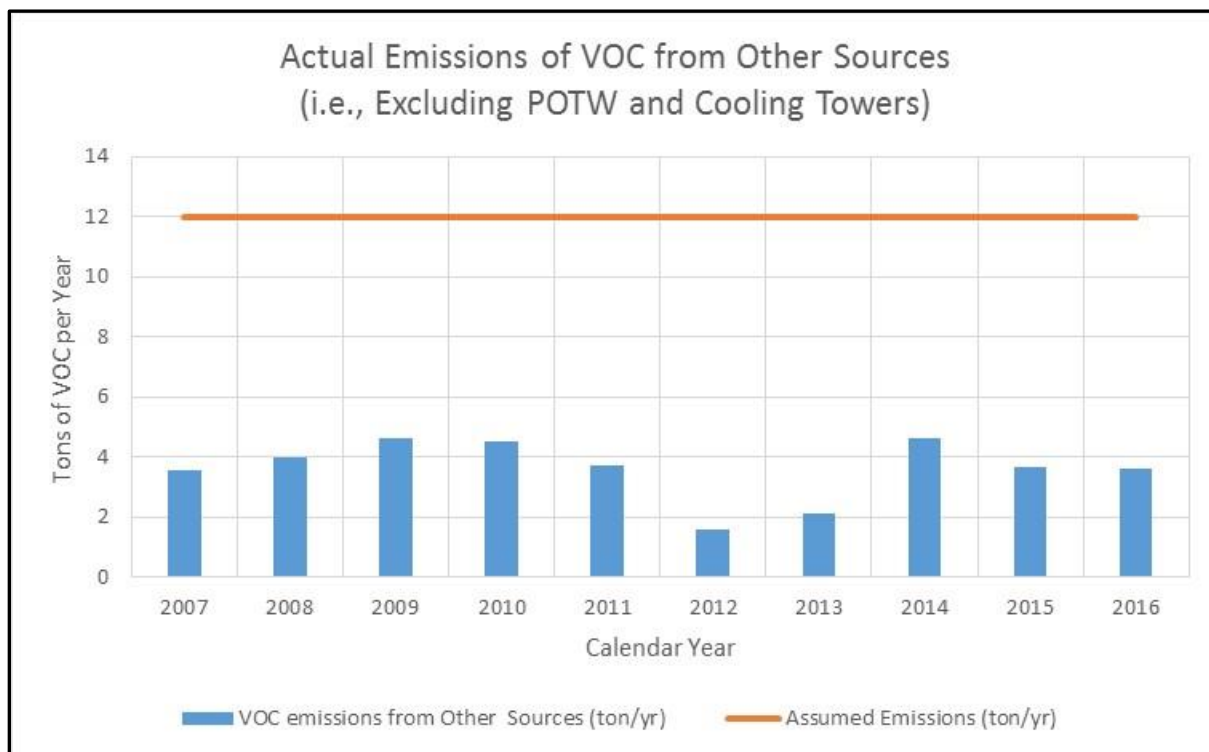
Acme is electing to accept a VOC emission limit on the cooling towers to remain a PSD minor source after implementing the cooling tower project. The table below provides the facility-wide

² Acme estimated ~15% of the wastewater is recycled to the formaldehyde process and about half this amount is recycled to the aqueous ammonia batch process.

emissions of VOCs before and after modification. As a conservative assumption, Acme has requested to set all VOC emission sources, excluding the cooling towers, at 12 tons per year. This value exceeds the potential emissions for these sources. This assumption also allows the facility to limit VOC emissions from the cooling towers to less than 88 tons per year to ensure compliance with PSD. The PSD avoidance condition will require tracking of only emissions from the cooling towers. The condition is provided in Attachment 1 to this permit review.

Potential VOC Emissions from the Facility			VOC Emissions after PSD Avoidance Limits		
VOC Emissions from Cooling Towers	VOC Emissions from Other Emission Sources	Total VOC Emissions	VOC Emissions from Cooling Towers	VOC Emissions from Other Emission Sources	Total VOC Emissions
127.7	8.3	147.7	<88	12	<100

To ensure 12 pounds per year of VOC emissions from other sources is a conservative assumption, actual emissions of VOC from the Acme were reviewed. Emissions of VOC over the past ten years were compared to the assumed emission rate from other sources. As shown in the figure below, actual emissions of VOC from other sources are well below the assumed emission rate used for compliance with the PSD avoidance limit.



7. NSPS, NESHAPS/MACT, NSR/PSD, 112(r), CAM

NSPS

Acme contains no emission sources subject to New Source Performance Standards (NSPS). This permit modification does not affect the NSPS status of the facility.

MACT/GACT

Acme is subject to the following Maximum Achievable Control Technology (MACT) standards.

MACT Subparts F, G, and H (aka the HON)

The formaldehyde CMPCU and parts of the hexamine CMPCU are existing sources under the HON. This permit modification does not affect the facility's status with respect to HON, and no changes to the permit are needed. Continued compliance is anticipated.

MACT Subpart FFFF

The special projects MPCU (ID No. ES-002-05) is an existing affected source under the MON, pursuant to 40 CFR 63, Subpart FFFF. This permit modification does not affect the facility's status with respect to MON, and no changes to the permit are needed. Continued compliance is anticipated.

Case-by-Case MACT and MACT DDDDD

The natural gas/No. 2 fuel oil-fired boiler (ID No. ES-001-01) is subject to the Case-by-Case MACT. The facility complies with the Case-by-Case MACT requirements until May 19, 2019 and thereafter must comply with "NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters," 40 CFR 63 Subpart DDDDD. This permit modification does not affect the facility's status with respect to these MACTs, and no changes to the permit are needed. Continued compliance is anticipated.

PSD

Acme is a chemical processing facility with a major source threshold under the PSD permitting program of 100 tons per consecutive 12-month period for one or more of any regulated NSR pollutants. Acme was previously classified as PSD major, and the facility accepted 40 tpy limits on emissions of NO_x and SO₂ from the temporary boiler (ID No. ES-001-01T) when it was added to the permit under Air Permit No. 01394T39 issued on May 9, 2008. Subsequently, Acme accepted a facility wide-emissions limit on SO₂ of 100 tons per consecutive 12-month period under Air Permit No. 01394T43 issued on June 5, 2012 to be an existing minor source under the PSD permitting program pursuant to 02D .0530. Acme did not have the potential to emit any other PSD-regulated pollutant at rates at or above the PSD major source thresholds at that time. No changes to the existing PSD avoidance limits for NO_x or SO₂ are required and continued compliance is anticipated.

With this modification, the potential emissions of VOC exceed the major source threshold under PSD. Acme is accepting a VOC emission limit on the cooling towers to remain minor for PSD after this modification. More discussion on the avoidance condition is provided above in Section 6. Compliance is anticipated.

112(r)

The facility is subject to Section 112(r) of the Clean Air Act requirements because it stores anhydrous ammonia, aqueous ammonia, and formaldehyde in quantities above the threshold quantities. This permit modification does not affect the facility's status with respect to 112(r), and no changes to the permit are needed. Continued compliance is anticipated

CAM

Acme is not subject to 40 CFR Part 64 CAM, and this permit modification does not affect the CAM status.

8. Facility Wide Air Toxics

Emission limits under 15A NCAC 02D .1100 were removed from the permit for MACT sources with the issuance of Air Permit No. 01394T46 on May 3, 2016. As part of the permit review for that permit, the DAQ conducted a facility-wide evaluation demonstrating the removal of the emission limits did not present "an unacceptable risk to human health," in accordance with G.S. 143-215. 107(b) as codified on May 1, 2014.

Emission limits for non-MACT sources remain in the permit. Acme ensures compliance by operating only one boiler (ID Nos. ES-001-01 or ES-001-01T) at a given time and maintaining records of TAP emissions from the non-MACT sources. Additionally, Acme conducted modeling to demonstrate compliance with NC Air Toxics with increased overheads water to the cooling towers and the closure of the POTW, as noted in Section 5 above. Because the contribution from the cooling towers emissions to the ambient concentrations was negligible even with the most conservative emission profile (i.e., Scenario 3), no limitation on the overheads flowrate to the cooling tower is required. The table below demonstrates the contributions from the cooling tower emissions.

Emission Source	Modeled Concentration of Ammonia (µg/m3)	% Contribution	Modeled Concentration of Formaldehyde (µg/m3)	% Contribution
Cooling Tower 3 (ID No. ES-003-03)	0.23893	0.01%	0.03044	0.02%
Cooling Tower 6 (ID No. ES-003-06)	0.30742	0.02%	0.0067	0.01%
Cooling Tower 7 (ID No. ES-003-07)	0.42097	0.02%	0.00873	0.01%
All Cooling Towers	0.96731	0.05%	0.04587	0.04%
All Emission Sources	2000.412	100.00%	128.9407	100.00%

The NC Air Toxics under 02D .1100 was updated to add semiannual reporting of any exceedance of the permitted limits. The revised permit condition for compliance with NC Air Toxics is provided in Attachment 2 to this permit review.

9. Facility Emissions Review

Facility-wide emissions after the modification to remove the POTW are provided in table below. Actual emissions from 2011 to 2015 are provided in the header of this permit review.

Pollutant	Emissions After Controls/Limits (tons/yr)
PM/PM ₁₀ /PM _{2.5}	8.9
SO ₂	0.26
NO _x	71.7
CO	10.0
VOC	<100
Largest HAP (methanol)	82.7
Total HAPs	95.5
Total CO ₂ e	17,466
<u>Notes:</u> CO ₂ equivalent is defined as the sum of individual greenhouse gas pollutant emission times their global warming potential, converted to metric tons. CO ₂ , CH ₄ , and N ₂ O emission factors, which are used to determine CO ₂ e emissions, are based on GHG MRR (40 CFR 98 Subpart C, amended 11/29/2013).	

10. Compliance Status

The most recent compliance inspection was conducted on June 8, 2017, by Mark Hedrick of the WiRO. The facility appeared to be in compliance with all applicable requirements at that time. Additionally, a signed Title V Compliance Certification (Form E5) indicating the facility was in compliance with all applicable requirements was included with the permit application.

Acme has had the following compliance issues within the past five years:

- A Notice of Deficiency (NOD) was issued on October 5, 2012 for failure to record a monthly visual inspection of the free-flow hexamine bagging operation cartridge filter (ID No. CD-001-02e).
- A Notice of Violation (NOV) was issued on November 24, 2014 for the facility for allowing one hexamine reactor to bypass natural gas/LPG-fired the catalytic oxidizer (ID No. CD-001-02b).

All NOV's and NOD's have been resolved.

11. Public Notice/EPA and Affected State(s) Review

A notice of the DRAFT Title V Permit shall be made pursuant to 15A NCAC 02Q .0521. The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Consistent with 15A NCAC 02Q .0525, the EPA will have a concurrent 45-day review period. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 02Q .0522, a copy of each permit application, each proposed permit and each final permit pursuant shall be provided to EPA. Also, pursuant to 02Q .0522, a notice of the DRAFT Title V Permit shall be provided to each affected State at or before the time notice is provided to the public under 02Q .0521 above. The state of South Carolina is within 50 miles of the facility and will be notified accordingly.

12. Other Regulatory Considerations

- A P.E. seal is NOT required for this application.
- A zoning consistency determination is NOT required for this application.

- A permit application fee of \$929 is required for this permit application and was included in the permit application received on March 8, 2017.

13. Recommendations

The permit modification application for Hexion Inc. - Acme Operations located in Riegelwood, Columbus County, NC has been reviewed by DAQ to determine compliance with all procedures and requirements. DAQ has determined that this facility is complying or will achieve compliance, as specified in the permit, with all requirements that are applicable to the affected sources. The DAQ recommends the issuance of Air Permit No. 01394T49.

Attachment 1

PSD Avoidance Condition for VOCs for Cooling Towers (ID Nos. ES-003-03, ES-003-06, and ES-003-07)

4. **15A NCAC 02Q .0317: AVOIDANCE CONDITION for 15A NCAC 02D .0530: FACILITY-WIDE VOC EMISSIONS LIMITATION TO MAINTAIN MINOR STATUS UNDER THE PSD PERMITTING PROGRAM**

- a. In order to avoid applicability of 15A NCAC 02D .0530(g), these sources (**ID Nos. ES-003-03, ES-003-06, and ES-003-07**) shall discharge into the atmosphere less than 88 tons of VOCs per consecutive 12-month period.

Testing [15A NCAC 02Q .0508(f)]

- b. If emissions testing is required, the testing shall be performed in accordance General Condition JJ. If the results of this test are above the limit given in Section 2.1 H.4.a above, the Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530.

Monitoring/Recordkeeping [15A NCAC 02Q .0508(f)]

- c. Each calendar month, the Permittee shall calculate VOC emissions for the previous month and previous 12-month period and record the calculated emissions in a logbook (written or electronic format). The Permittee shall calculate VOC emissions from the cooling towers (**ID Nos. ES-003-03, ES-003-06, and ES-003-07**) based on production and emission factors contained in the Title V permit application (Application No. 2400093.17A). All other sources of VOC emissions (tankage, equipment leaks, wastewater, hexamine production, etc.) may conservatively assume emissions of volatile organic compounds equal to 1 ton of VOC per month (12.0 tons total for 12 consecutive months). The Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530 if the recordkeeping is not conducted or maintained or if the VOC emissions exceed the limit in Section 2.1 H.4.a above.

Reporting [15A NCAC 02Q .0508(f)]

- d. The Permittee shall submit a summary report of monitoring and recordkeeping activities given in Section 2.1 H.4.c above postmarked on or before January 30 of each calendar year for the preceding six-month period between July and December, and July 30 of each calendar year for the preceding six-month period between January and June. The report shall contain the following:
 - i. The monthly emissions of VOC from the cooling towers (**ID Nos. ES-003-03, ES-003-06, and ES-003-07**) for each of the previous 17 months.
 - ii. The emissions of VOCs from the cooling towers (**ID Nos. ES-003-03, ES-003-06, and ES-003-07**) calculated for each of the consecutive 12-month periods over the previous 17 months.
 - iii. Any change in emission factor used from those contained in the Title V permit application (Application No. 2400093.17A).
 - iv. All instances of deviations from the requirements of this permit must be clearly identified.

Attachment 2

Permit Condition for Compliance with NC Air Toxics

STATE-ENFORCEABLE ONLY

1. 15A NCAC 02D .1100: CONTROL OF TOXIC AIR POLLUTANTS

- a. Pursuant to 15A NCAC 02D .1100, "Control of Toxic Air Pollutants," and in accordance with the approved application for an air toxic compliance demonstration, the following permit limits shall not be exceeded:
 - i. Arsenic. Total arsenic emissions from boiler (**ID No. ES-001-01T**) shall not exceed 0.80 pounds per year.
 - ii. Beryllium. Total beryllium emissions from boiler (**ID No. ES-001-01T**) shall not exceed 0.28 pounds per year.
 - iii. Chromium VI equivalent. Total soluble chromate compound emissions from boiler (**ID No. ES-001-01T**), measured as chromium VI equivalent, shall not exceed 4.13e-04 pounds per day.
 - iv. Nickel. Total soluble nickel emissions from boiler (**ID No. ES-001-01T**), measured as nickel, shall not exceed 0.32 pounds per day
 - v. Ammonia and Formaldehyde. Ammonia and Formaldehyde emissions shall not exceed any rate listed in the following table:

Emissions Source	Allowable Emission Rate	
	Ammonia	Formaldehyde
Boiler (ID No. ES-001-01T)	0.14 lb/hr	8.23e-03 lb/hr
Cooling Tower No. 3 (ID No. ES-003-03)	33.8 lb/hr	2.65 lb/hr
Cooling Tower No. 6 (ID No. ES-003-06)	16.9 lb/hr	1.33 lb/hr
Cooling Tower No. 7 (ID No. ES-003-07)	16.9 lb/hr	1.33 lb/hr
Environmental Intermediate Tank #1 (ID No. ES-T30)	--	1.78e-04 lb/hr
Environmental Intermediate Tank #2 (ID No. ES-T31)		1.78e-04 lb/hr
Environmental Intermediate Tank #3 (ID No. ES-T32)		1.78e-04 lb/hr
Environmental Feed Tank #1 (ID No. ES-T27)	--	1.78e-04 lb/hr
Environmental Feed Tank #2 (ID No. ES-T28)		1.78e-04 lb/hr
Environmental Feed Tank #3 (ID No. ES-T29)		1.78e-04 lb/hr
Wastewater tank for the hexamine CPU (ID No. ES-007.7)		1.78e-04 lb/hr
Wastewater tank for the hexamine CPU (ID No. ES-007.8)		1.78e-04 lb/hr
Wastewater tank for the hexamine CPU (ID No. ES-007.9)		1.78e-04 lb/hr
Wastewater tanks for the hexamine CPU (ID No. ES-007.10)		1.78e-04 lb/hr
Green Overheads Wastewater Tank (ID No. ES-T53)	0.03 lb/hr	4.42e-05 lb/hr
Aqua Ammonia Unloading Operation (ID No. ES-NH3), including: <ul style="list-style-type: none"> • Area 1 • Area 2 	0.67 lb/hr 0.67 lb/hr	

Monitoring/Recordkeeping/Reporting

- b. To comply with the TAP emissions limitations in Section 2.2 B.1.a. above, the Permittee shall not fire back-up boiler (**ID No. ES-001-01T**) while firing natural gas/No. 2-fuel oil-fired boiler (**ID No. ES-001-01**).
- c. The Permittee shall retain records of TAP emissions from each of the affected sources as listed above. The record shall include calculations and supporting data. Required records of emission rates and emissions calculations shall be maintained in a logbook. The logbook (in written or electronic form) shall be kept on-site and made available to DAQ personnel upon request.
- d. The Permittee shall submit a semiannual summary report, of monitoring and recordkeeping activities postmarked on or before January 30 of each calendar year for the preceding six-month period between July and December and July 30 of each calendar year for the preceding six-month period between January and June. The report shall identify any deviations with 15A NCAC 02D .1100 during the six-month reporting period, including exceedance of any hourly emission limitation. If there were no deviations during the six-month reporting period, the report shall include a statement as such.